CLAIMS

What is claimed is:

1. A drive system for a vehicle, the vehicle having a transmission with an output for providing rotary power to each of a front and a rear set of wheels, the drive system comprising:

a first differential operably connected to the output of the transmission and operable to receive a drive torque;

a power take-off unit operably connected to the first differential;

a second differential connecting the power take-off unit to the rear wheel set and operable to provide the drive torque to the rear wheel set; and

a two mode drive unit operably positioned between the power take-off unit and the second differential;

wherein the two mode drive unit is operable to shift between a high range all-wheel drive operation and a low range all-wheel drive operation.

2. The system of Claim 1, wherein the two mode drive unit comprises a mechanical connector operable to directly mount the two mode drive unit to the second differential.

3. The system of Claim 2, comprising a prop shaft operably connected between the power take-off unit and the two mode drive unit.

4. The drive system of Claim 1, wherein the two mode drive unit comprises a mechanical connector operable to directly mount the two mode drive unit to the power take-off unit.

5. The system of Claim 4, comprising a prop shaft operably connecting the two mode drive unit and the second differential.

6. The system of Claim 1, wherein the two mode drive unit comprises a shift device operable to shift between the high range all-wheel drive operation and the low range all-wheel drive operation.

7. The system of Claim 1, comprising:

at least a pair of planetary gear sets disposed in the first differential;

wherein the planetary gear sets operably function as a gear reduction unit when in the low range all-wheel drive operation.

8. A drive train for a vehicle, the vehicle having a transmission with an output for providing rotary power to each of a first and a second set of wheels, the drive train comprising:

a first differential operable to receive the rotary power from the transmission and split the rotary power into a first portion operable to drive the first set of wheels and a second portion;

a power take-off unit operable to receive the second portion of the rotary power from the first differential;

a second differential operable to rotate the second set of wheels;

a drive unit operably connectable between the power take-off unit and the second differential; and

a plurality of drive unit gears operable to provide at least a first mode having the second portion multiplied by a first predetermined gear ratio and a second mode having the second portion multiplied by a second predetermined gear ratio.

9. The drive train of Claim 8, comprising:

a shift collar within the drive unit operable to select between the first mode and the second mode; and

a plurality of engagement plates operable to engage selected ones of the plurality of drive unit gears;

wherein the shift collar is operably movable to engage selected ones of the engagement plates in each of a first collar position corresponding to the first mode and a second collar position corresponding to the second mode.

10. The drive train of Claim 9, wherein the plurality of drive unit gears further comprises:

an internal gear slidably joined to the shift collar;

a planet carrier rotatable within the internal gear; and

a plurality of planet gears positionable about the planet carrier.

11. The drive train of Claim 10, wherein the plurality of engagement plates comprises:

a first dog-ring plate fixedly connected to the planet carrier; and

a second dog-ring plate fixedly connected to the shift collar;

wherein the first collar position defines the first mode having the first dog-ring plate operably engaged with the second dog-ring plate.

12. The drive train of Claim 11, further comprising:

a housing containing the plurality of drive unit gears;

a third dog-ring plate fixedly connected to the housing;

wherein the second collar position defines the second mode having the second dog-ring plate operably connected to the third dog-ring plate.

13. The drive train of Claim 8, wherein the plurality of drive unit gears comprises a sun gear operable to deliver a vehicle drive torque to the second differential.

14. The drive train of Claim 8, comprising:

a connector operable to directly connect the drive unit to the power take-off unit; and

a prop shaft operably connecting the drive unit to the second differential.

15. The drive train of Claim 8, comprising:

a connector operable to directly connect the drive unit to the second differential; and

a prop shaft operably connecting the power take-off unit to the drive unit.

16. A method for transferring drive train power in an all-wheel drive vehicle, the vehicle having a transmission connected via a front differential and a power take-off unit to a rear differential, the method comprising:

positioning a two mode drive unit between the power take-off unit and the rear differential;

engaging a preselected group of gears within the drive unit to operably provide at least a first gear configuration and a second gear configuration; and

shifting the plurality of gears in the drive unit between one of the first gear configuration corresponding to a high speed mode and the second gear configuration corresponding to a low speed mode of operation for the all-wheel drive vehicle.

17. The method of Claim 16, comprising directly mounting the drive unit to the vehicle rear differential.

18. The method of Claim 16, comprising remotely linking the drive unit to the vehicle rear differential using a prop shaft.

19. The method of Claim 16, comprising dividing a vehicle drive torque between each of the vehicle rear differential and the vehicle front differential.

20. The method of Claim 19, comprising changing a portion of the vehicle drive torque divided to each of the vehicle rear differential and the vehicle front differential.

21. A vehicle drivetrain comprising:

a first differential adapted to receive a rotary input from a vehicle transmission, the first differential having a first output and a second output, the first output being configured to drive a first set of vehicle wheels;

a power take-off unit having an input and an output, the input being coupled to the first differential and receiving rotary power from the second output;

a multi-speed gearbox having an input and an output, the input of the multi-speed gearbox receiving rotary power from the output of the power take-off unit, the multi-speed gearbox being operable in at least a first gear ratio and a second gear ratio; and

an axle having a second differential, the second differential having an input that receives rotary power from the output of the multi-speed gearbox.

22. The vehicle drivetrain of Claim 21, wherein a prop shaft operably couples the output of the power take-off unit and the input of the multi-speed gearbox.

23. The vehicle drivetrain of Claim 21, wherein a prop shaft operably couples the output of the multi-speed gearbox and the input of the second differential.

24. The vehicle drivetrain of Claim 21, wherein the first differential employs an epicyclic gear set.

25. The vehicle drivetrain of Claim 21, wherein the multi-speed gearbox includes an epicyclic gear set having a ring gear, a plurality of planet gears meshingly engaged with the ring gear, and wherein the input of the multi-speed gearbox is meshingly engaged with the plurality of planet gears.

26. The vehicle drive train of Claim 25, wherein the ring gear is stationary relative to the input of the multi-speed gearbox when the multi-speed gearbox is operated in the first gear ratio.

27. The vehicle drive train of Claim 26, wherein the ring gear co-rotates with the input of the multi-speed gearbox when the multi-speed gearbox is operated in the second gear ratio.